

Transport In the Northeast - 2012

OTC/MANE-VU Fall Meeting

November 15, 2012

Washington, D.C.

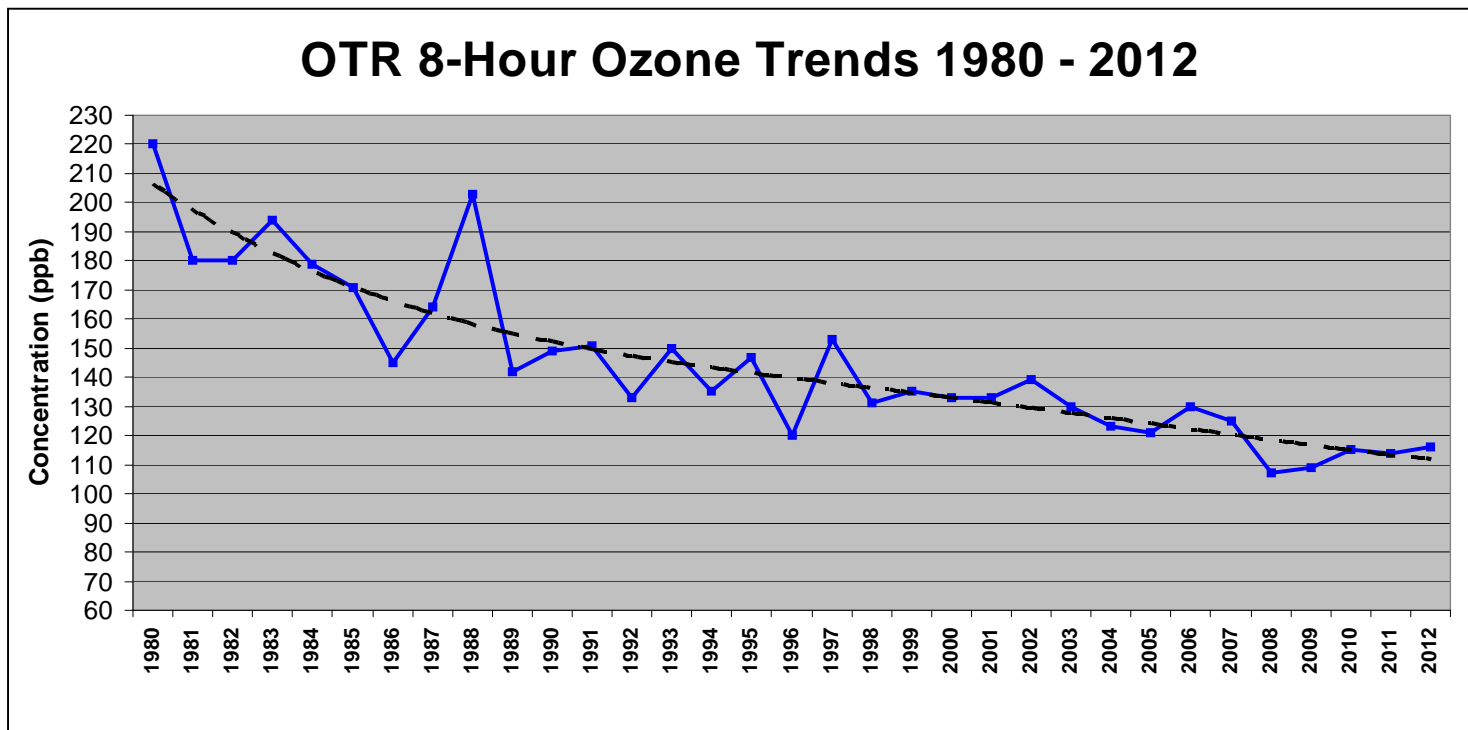


OZONE
TRANSPORT
COMMISSION

OZONE TRANSPORT COMMISSION

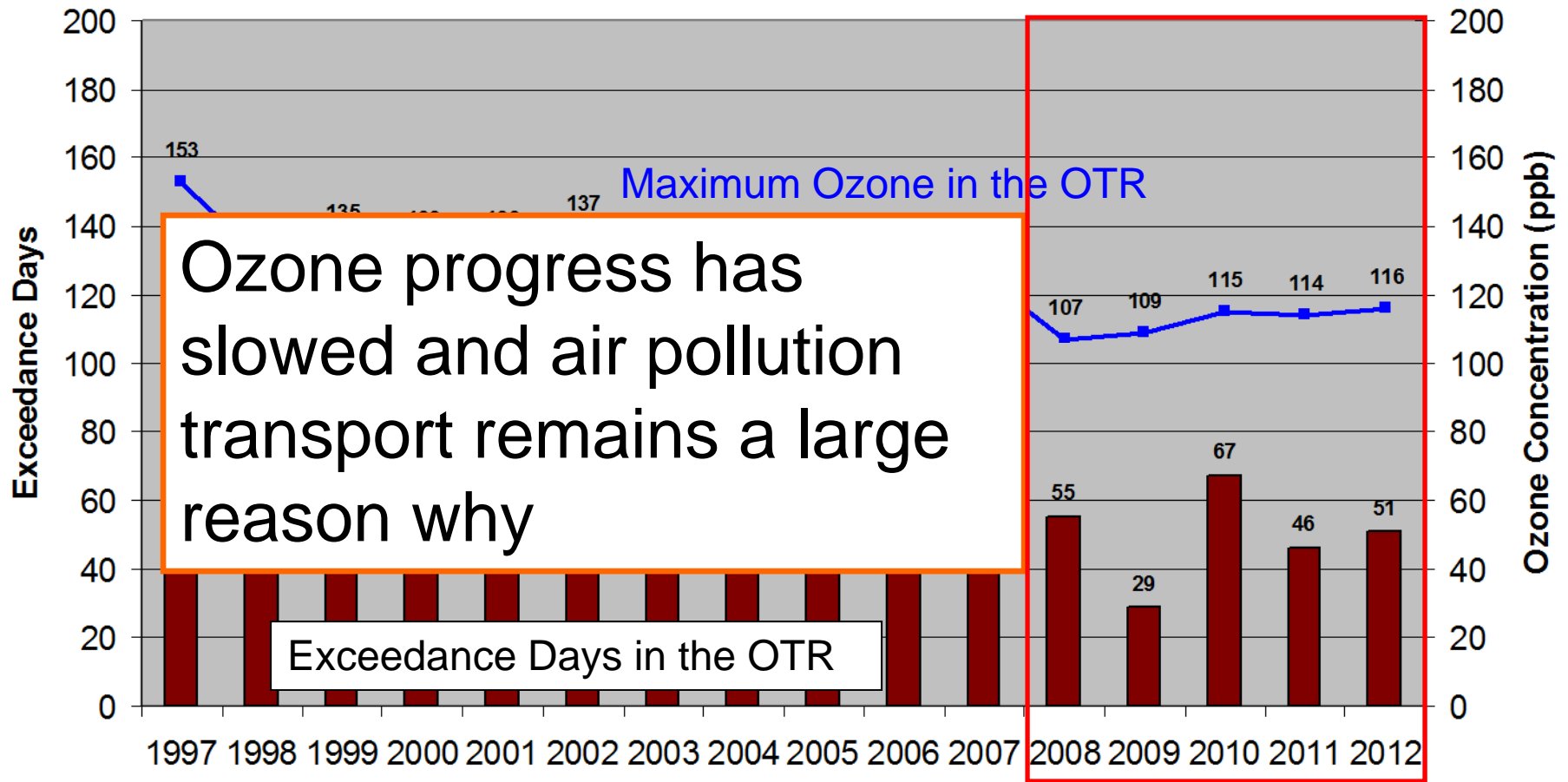
Ozone Reduction Success!

- The States of the Ozone Transport Region have made great progress in reducing ozone within the OTR
- Control measures focusing on a local and regional basis have worked!



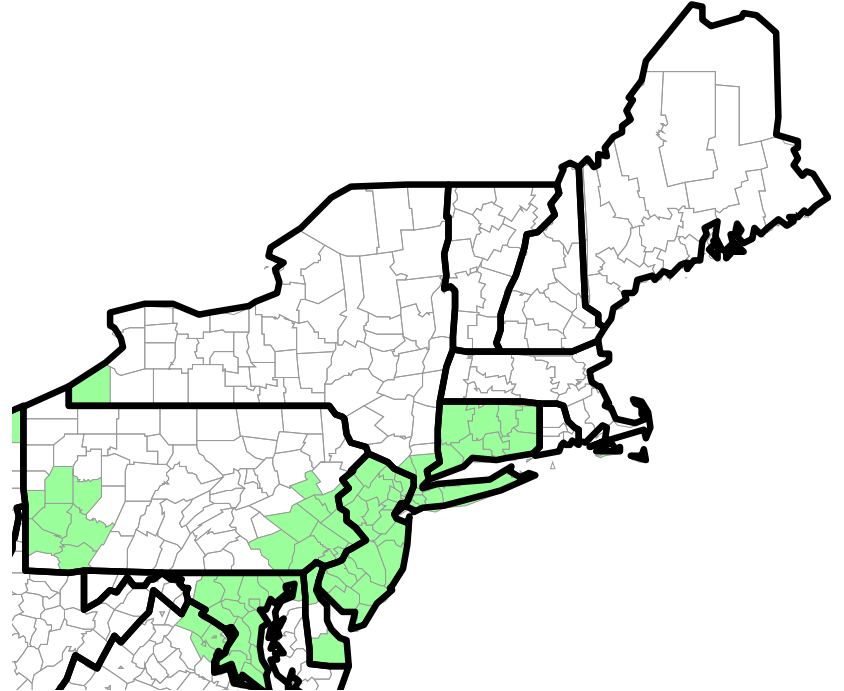
A Closer Look at the Last 15 Years

OTR 8-Hour Ozone Trends 1997 - 2012



Meeting Ozone Attainment

- Geographically, the number of areas in the OTR failing to meet clean air standards is less than 25%
- However about 65% of our population lives in these areas

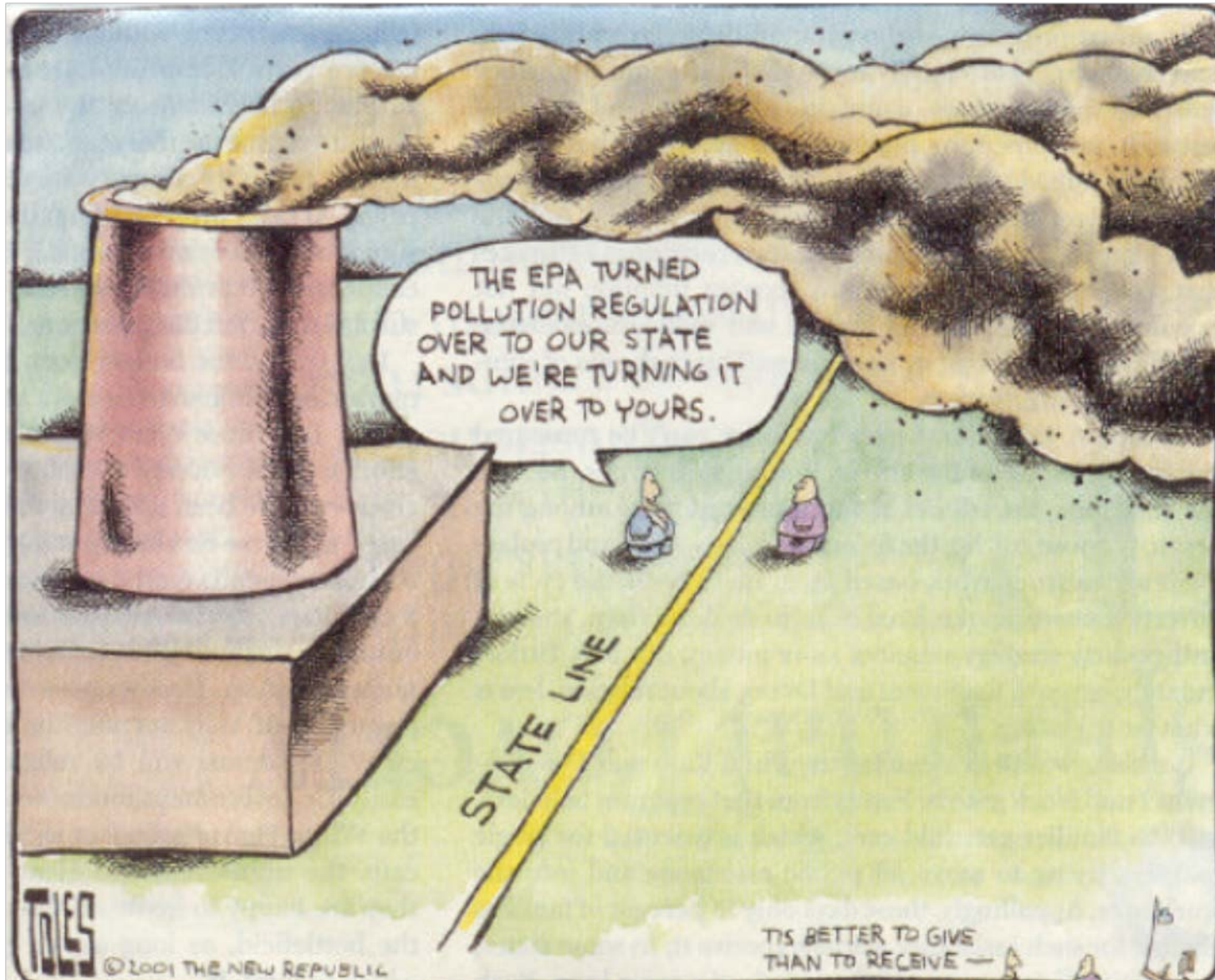


Meeting Ozone Attainment

Many locations of the Northeast need super-regional and/or national pollution controls in order to meet ozone attainment

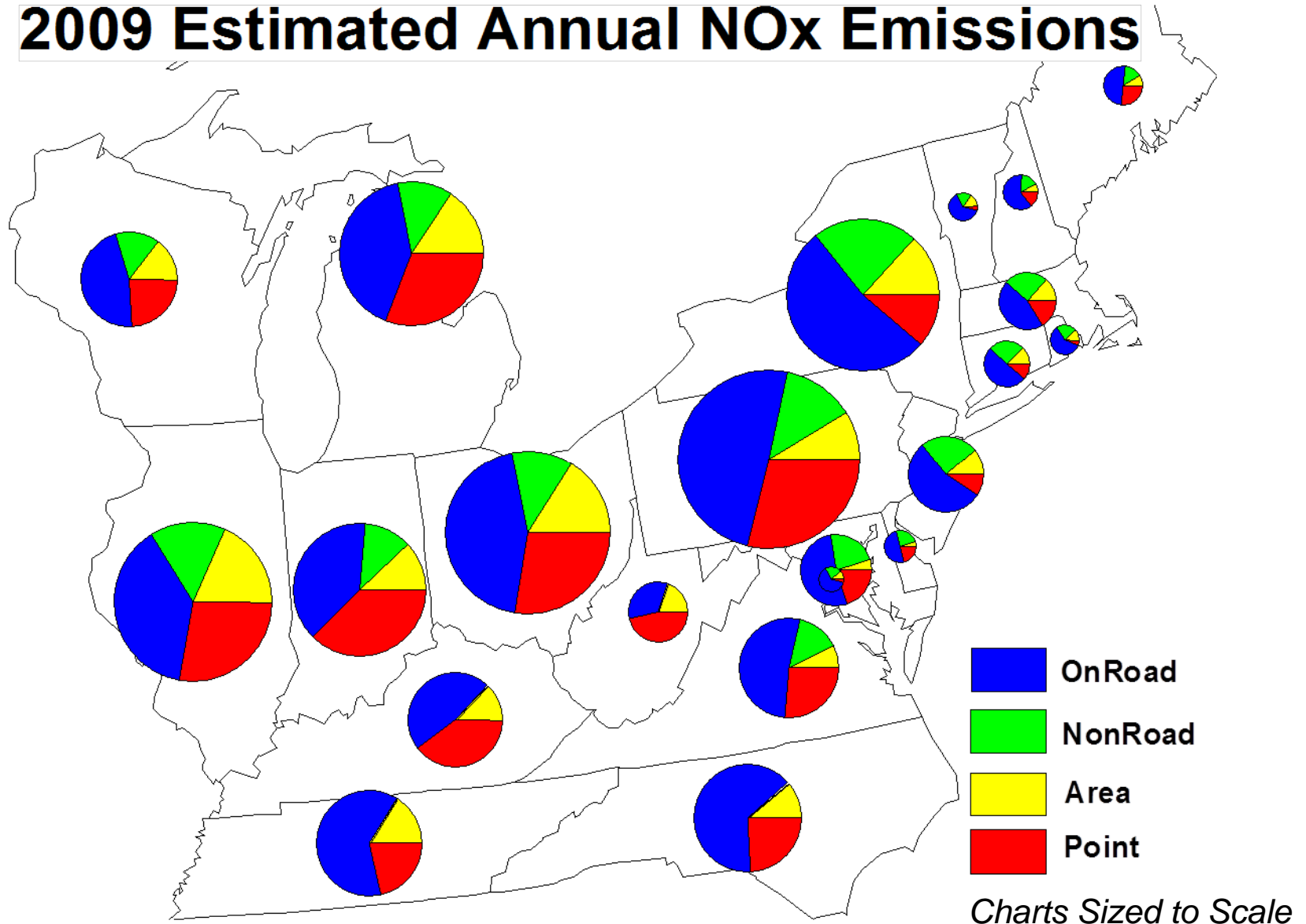
- Remaining options for local emission controls are generally few and very expensive
- Remaining options to address transport from upwind of the OTR are cost effective

Life as a Downwind State

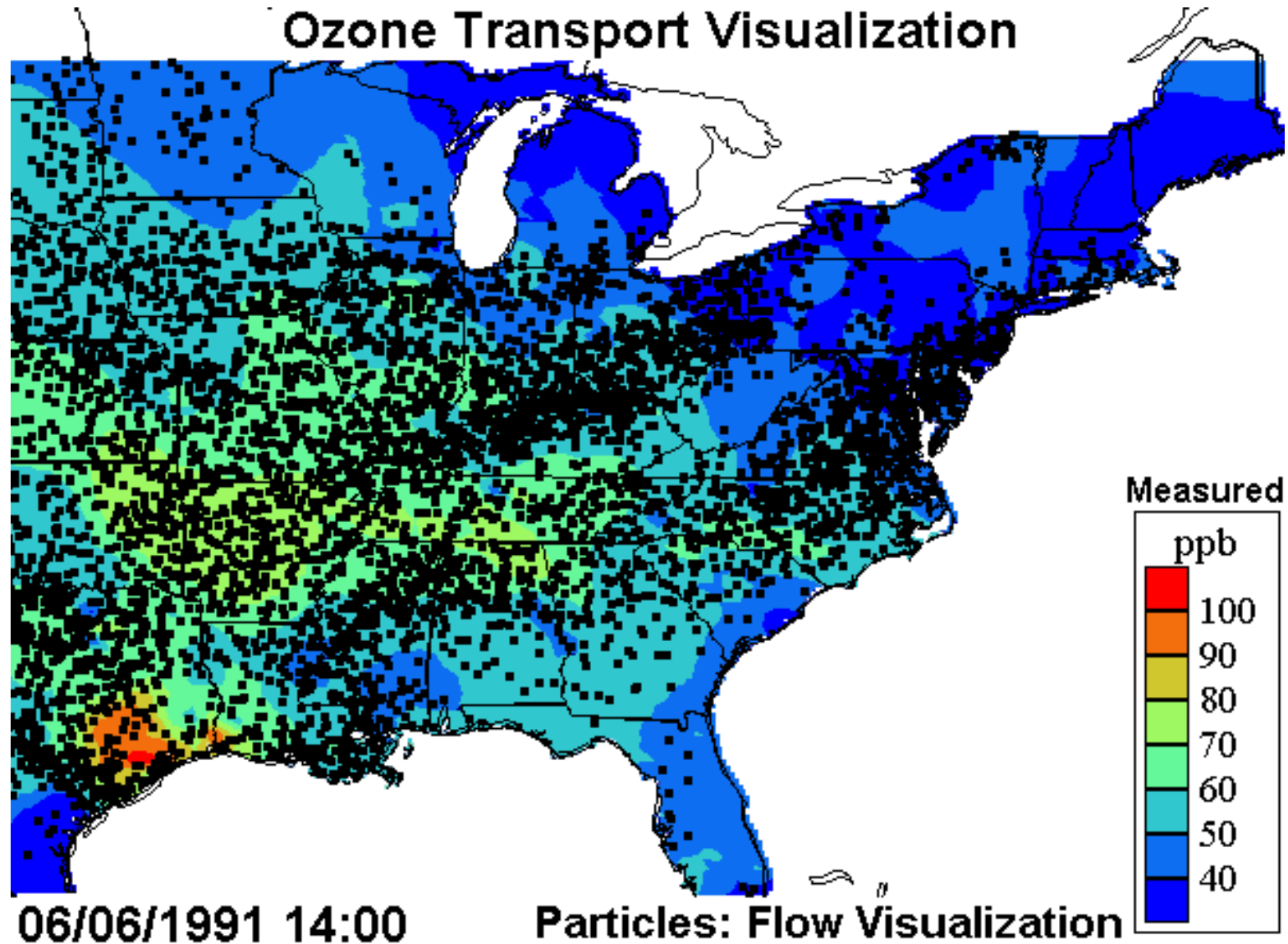


Where the Emissions Are

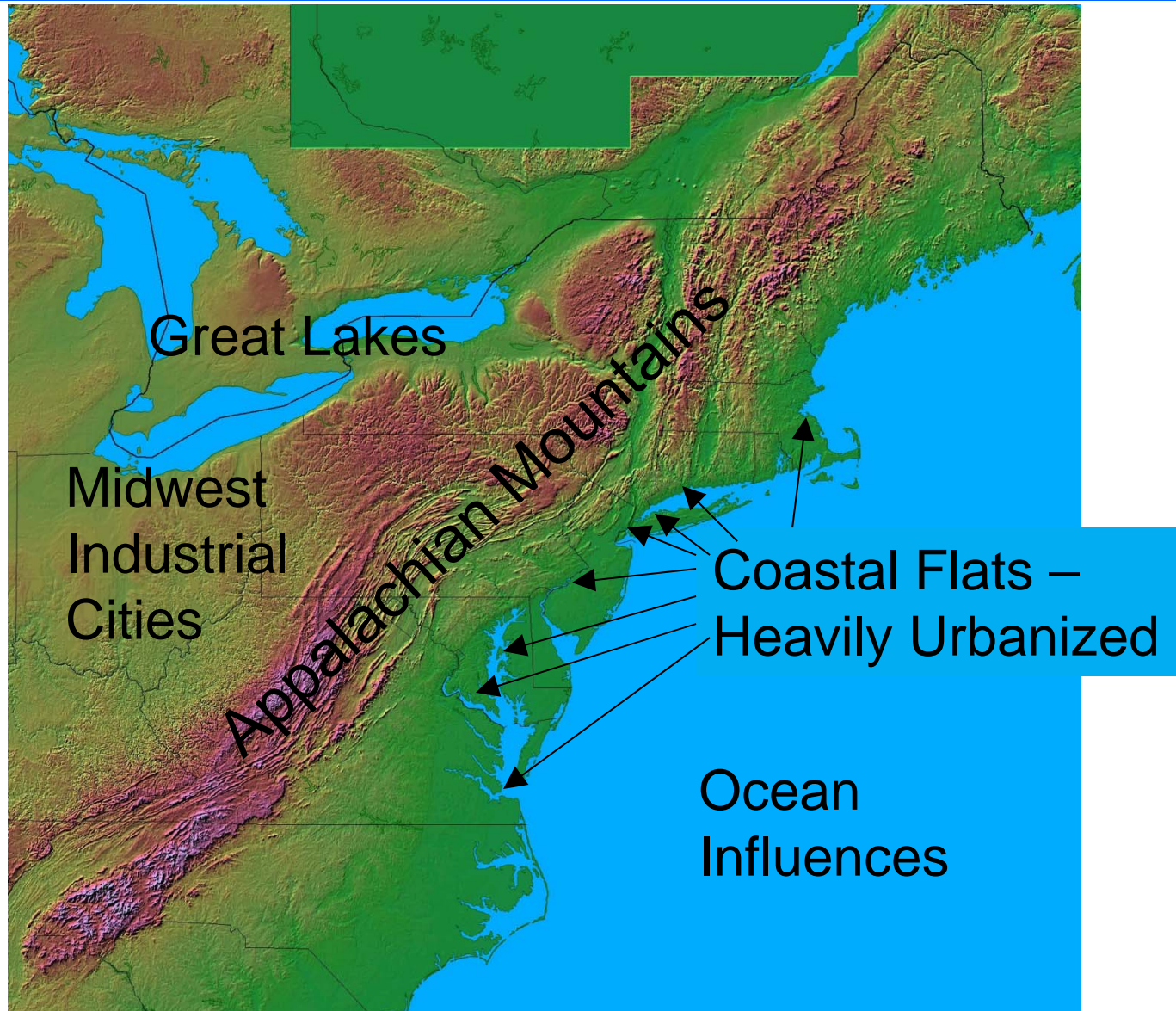
2009 Estimated Annual NOx Emissions



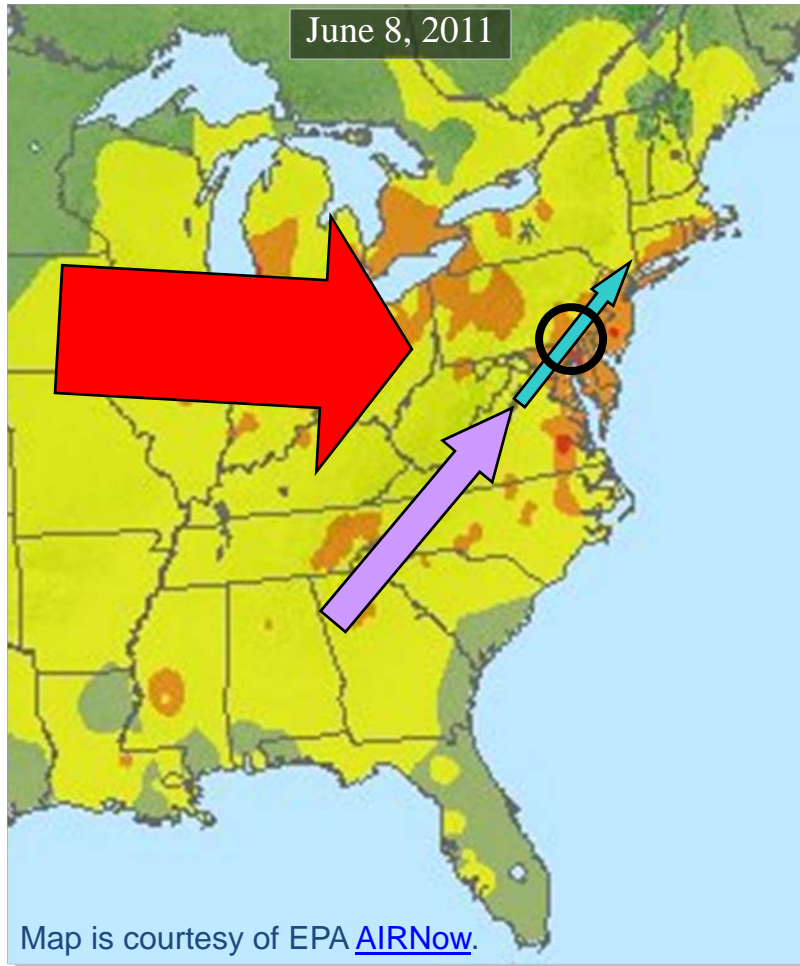
A Reproduction of How Air Moves



Topography of the OTR



Major Air Pollution Transport Mechanisms

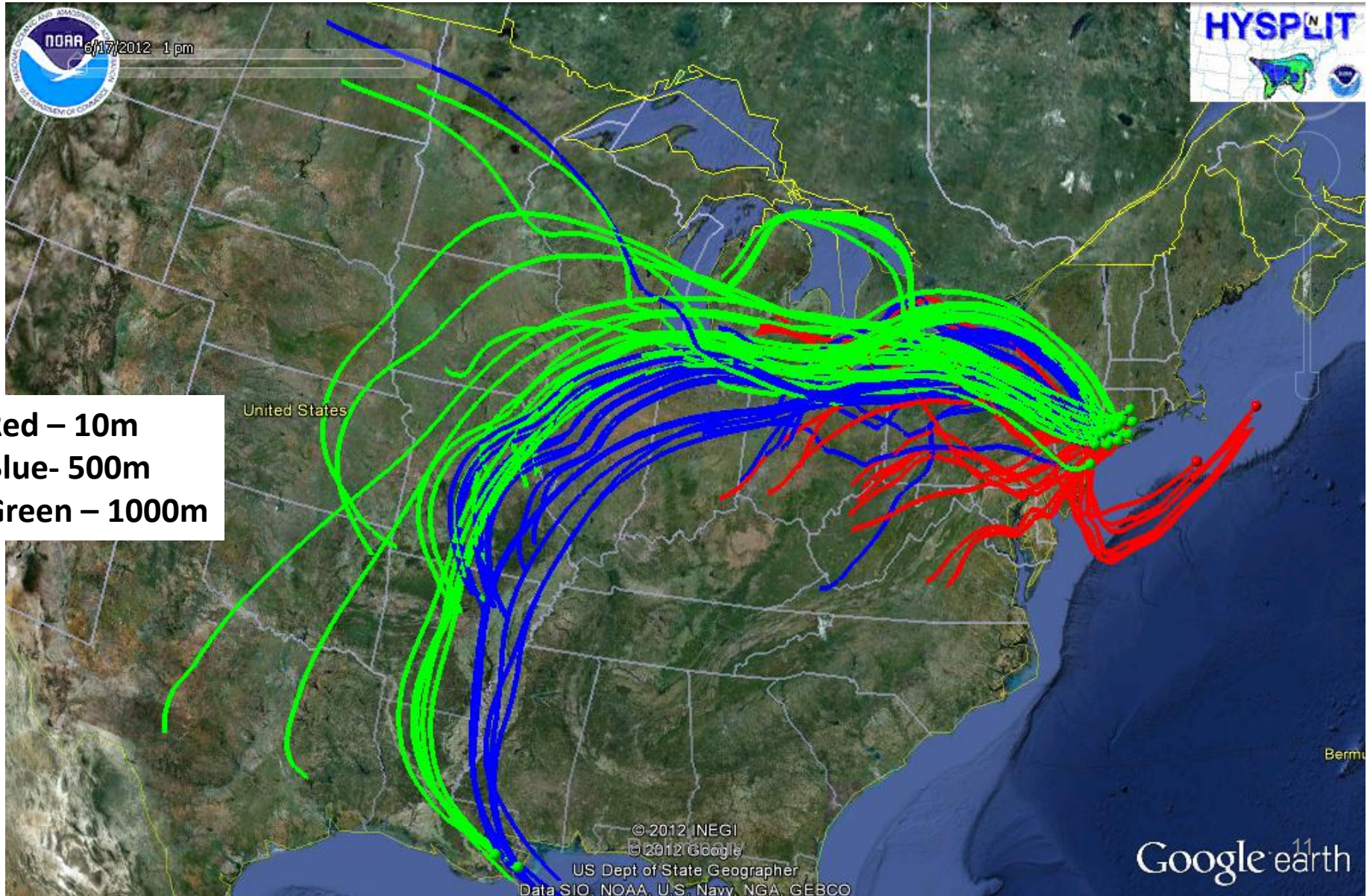


Four Distinct Parts

1. **Local Stagnation** - Local emissions in Cities (nonattainment areas)
 - Reducing local emissions can be important
2. **Surface**, 10's to 100 miles
 - City to city
 - “Ground level” transport
 - Washington to Baltimore, Baltimore to Philadelphia, etc.
3. **Channeled**, 100's of miles – **Regional Nocturnal Low Level Jet**
 - “Aloft” transport at night !!!
 - Flows along mountain ridges
 - SW to NE along the Atlantic
4. **Synoptic Long range**, 100's to 1000's of miles,
 - “Aloft” transport - 100s of miles
 - Generally from W or NW

Wind Flow Patterns on Five High Ozone Days in 2012

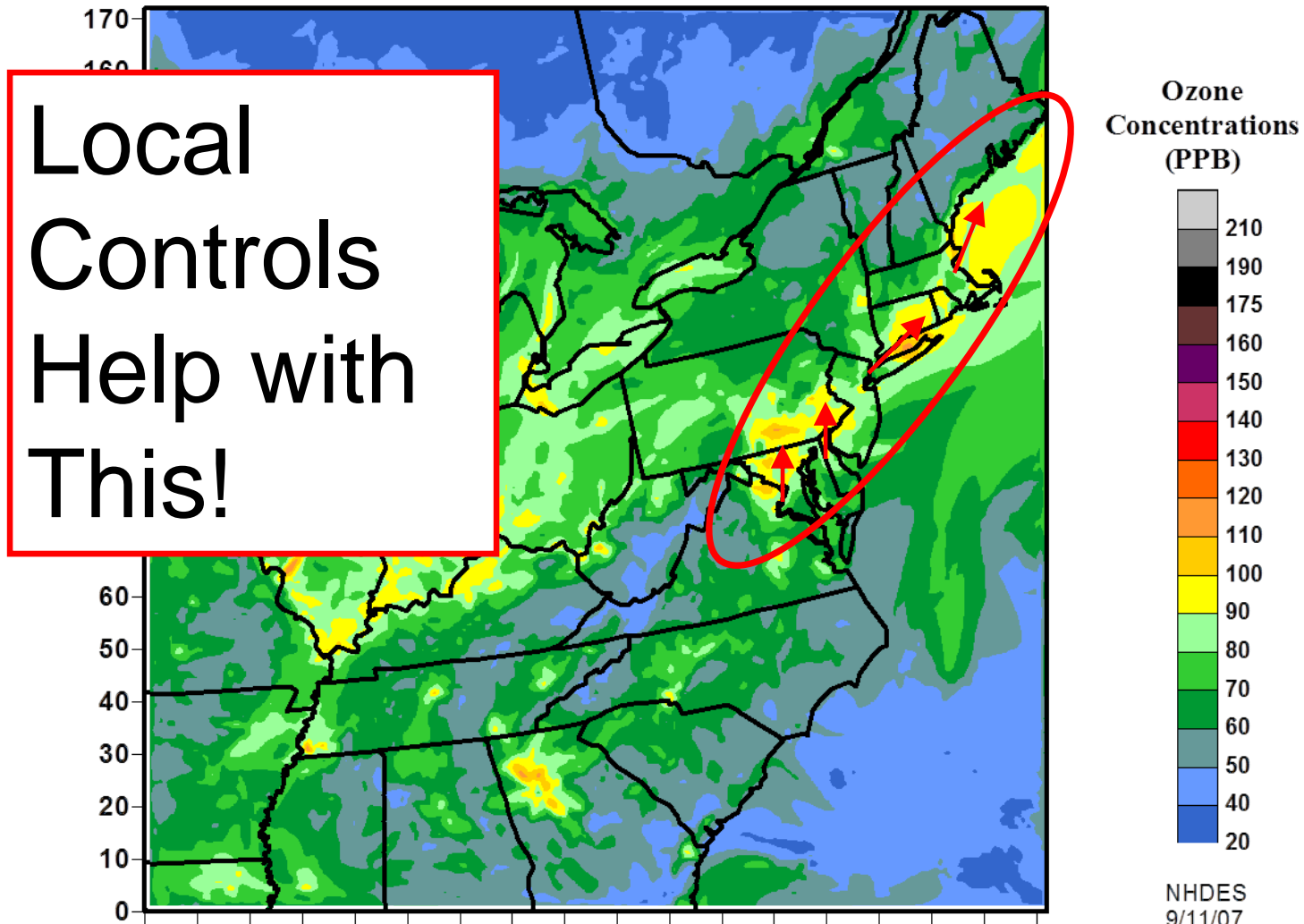
6/20, 7/1, 7/17, 7/18



Ground-Level – City to City

Maximum 8-Hour Ozone Concentrations
R005: MARAMA 5c Run

CALGRID 2.45 Modeling Domain - July 31 - August 16, 2002

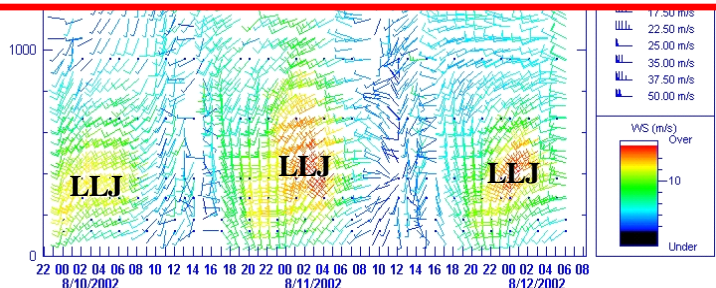


Channeled - Nocturnal Low Level Jet

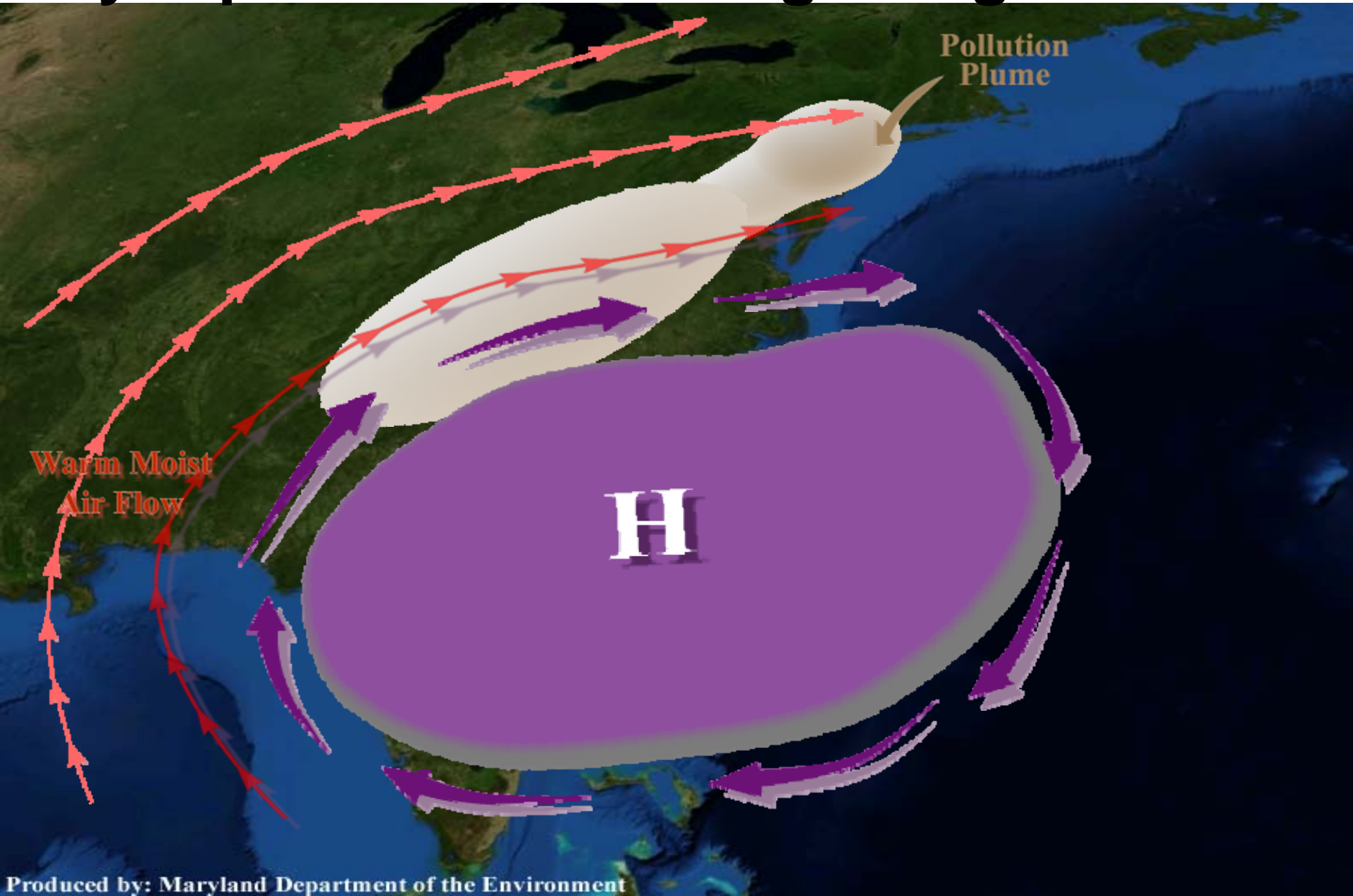


- Fast-moving, narrow “river” of air typically around 1000 feet above the surface
 - Can accelerate wind speeds to 40 mph or more.
- Typically observed during the night between Appalachians and the Atlantic Ocean.
 - Can contain ozone and/or its precursors
- Seen during most Mid-Atlantic summer-time air pollution events.
 - Ozone concentrations of 90 – 100 ppb have been measured in the NLLJ.

Local and Regional Controls Help with This!

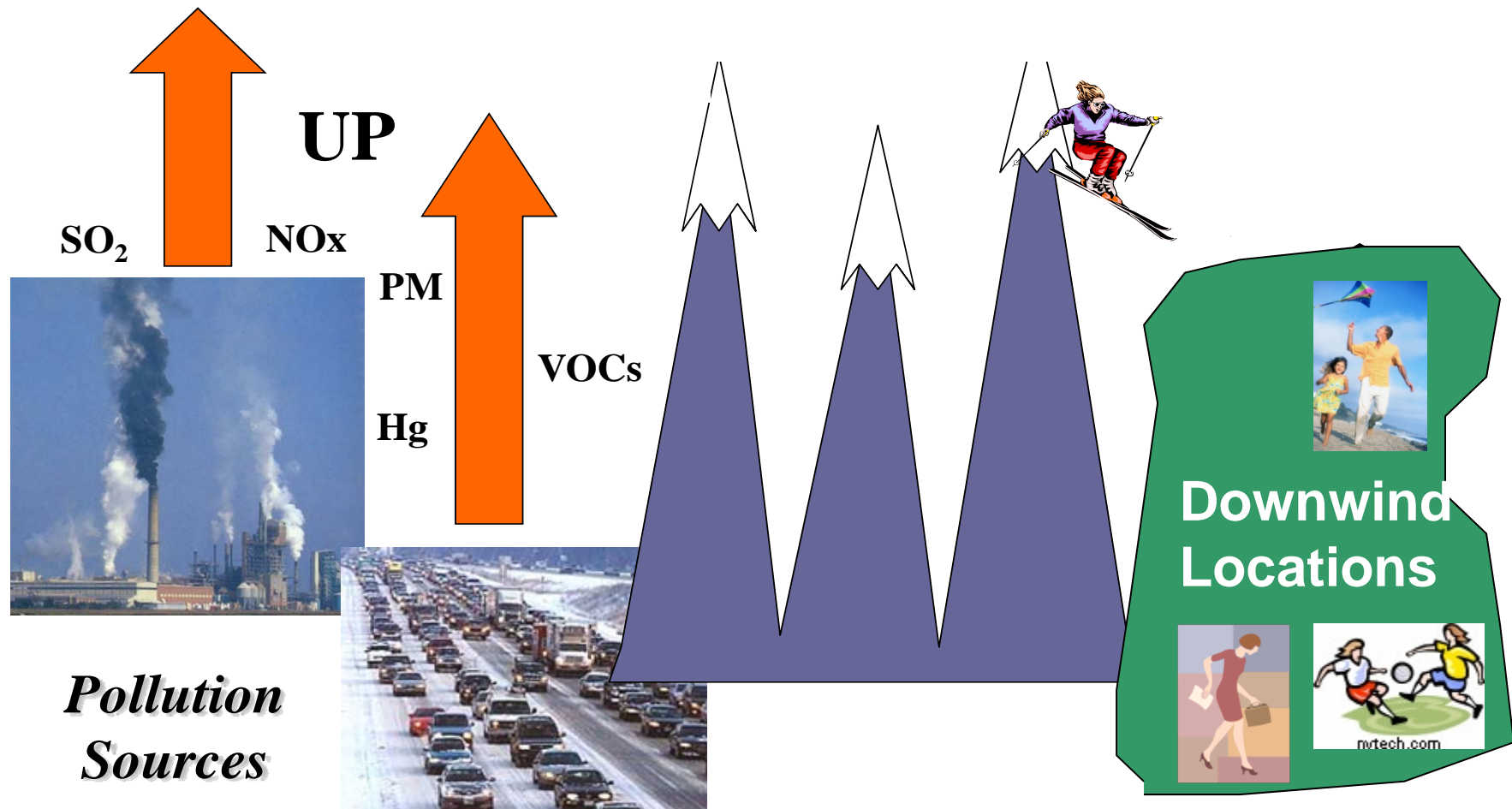


Synoptic - Classic Long-Range Pattern



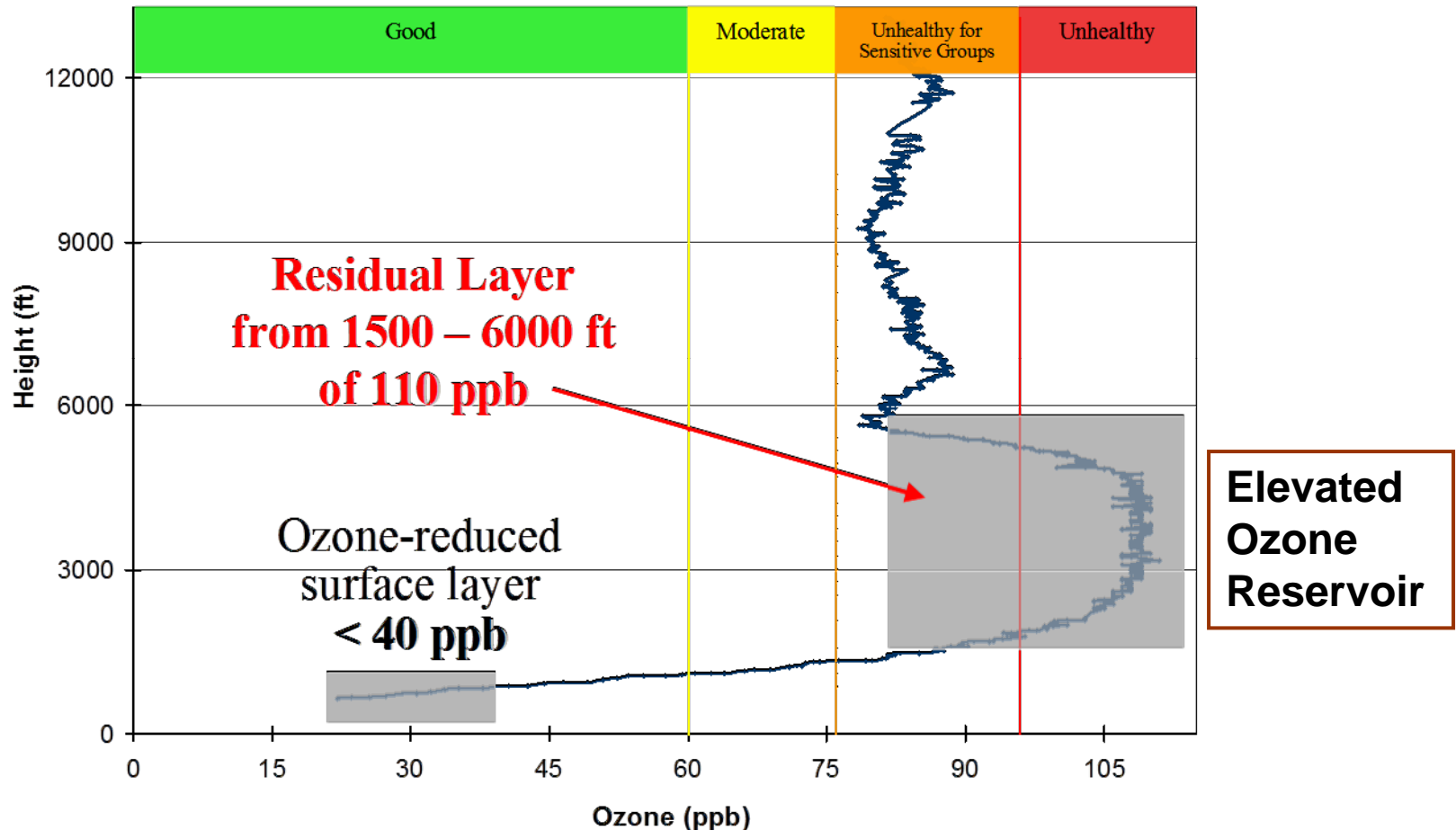
How Long-Distance Air Pollution Transport Works

During the heating of the day, pollutants rise upwards



Measurements Aloft Prove it's There

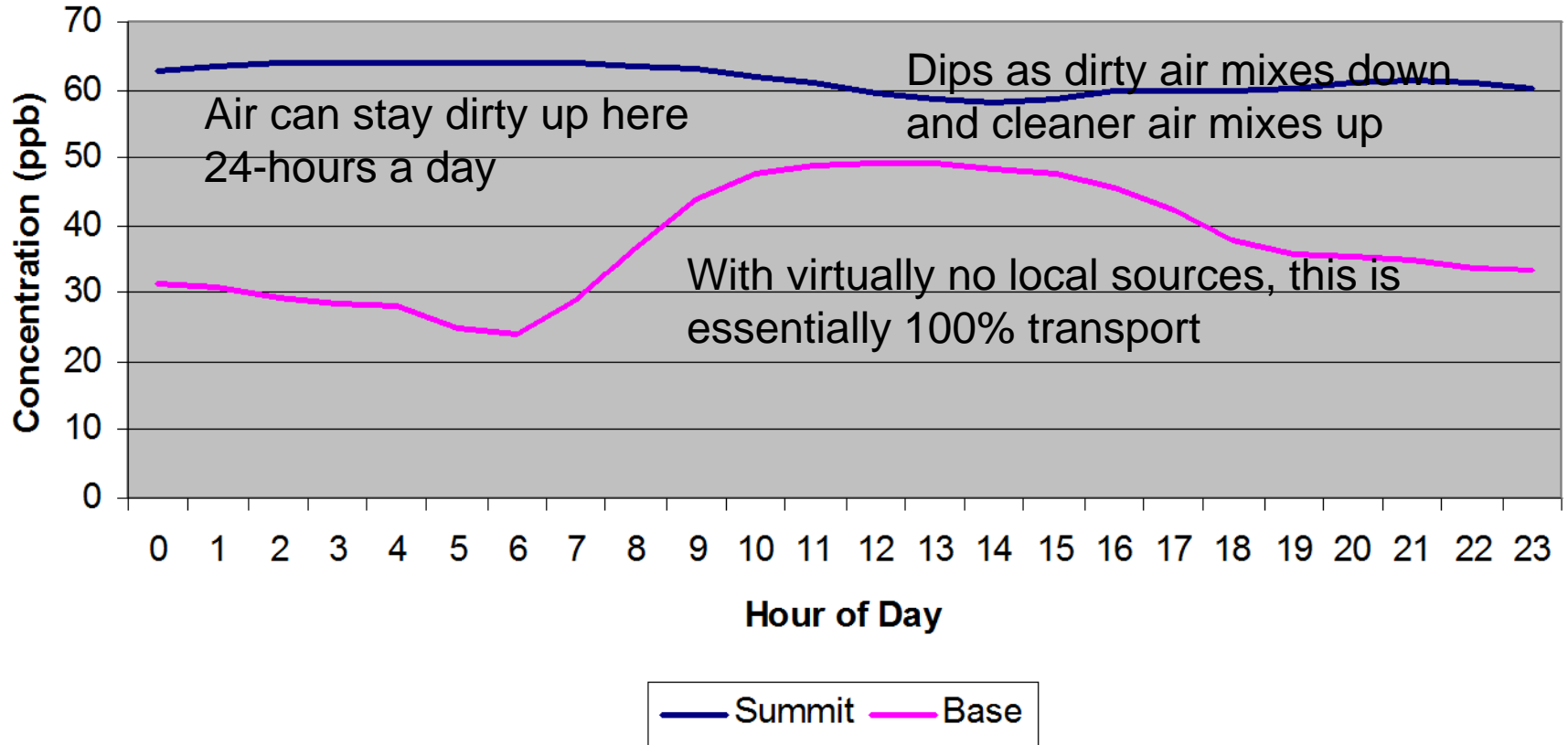
Incoming Ozone
August 2, 2005 (7:00 AM EDT)
Beltsville, MD



Source: Maryland Department of the Environment & Howard University

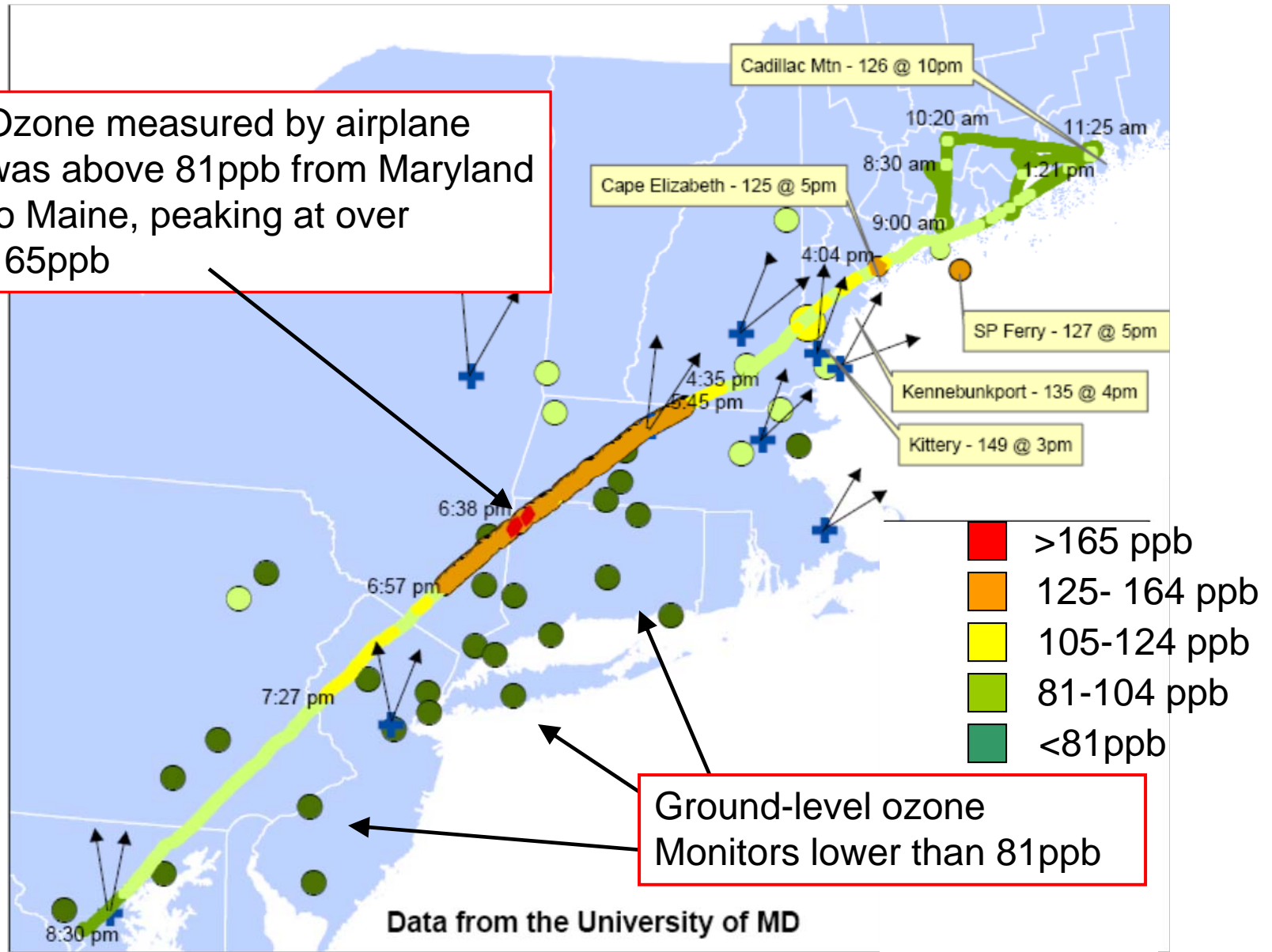
Mt. Washington, NH - Ozone? Really???

Average Diurnal Profile for the Top 10% Ozone Days at Mt. Washington Summit (2002-2008)



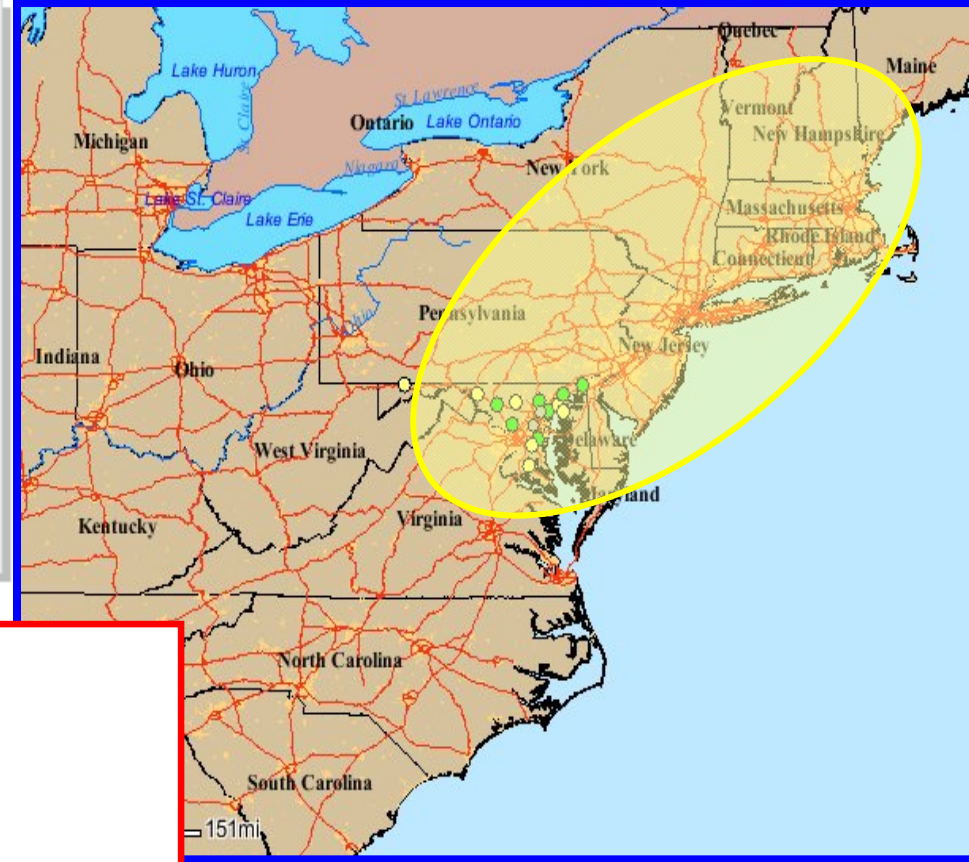
Ozone Aloft Measured by an Airplane

Ozone measured by airplane was above 81ppb from Maryland to Maine, peaking at over 165ppb



The Elevated Ozone Reservoir

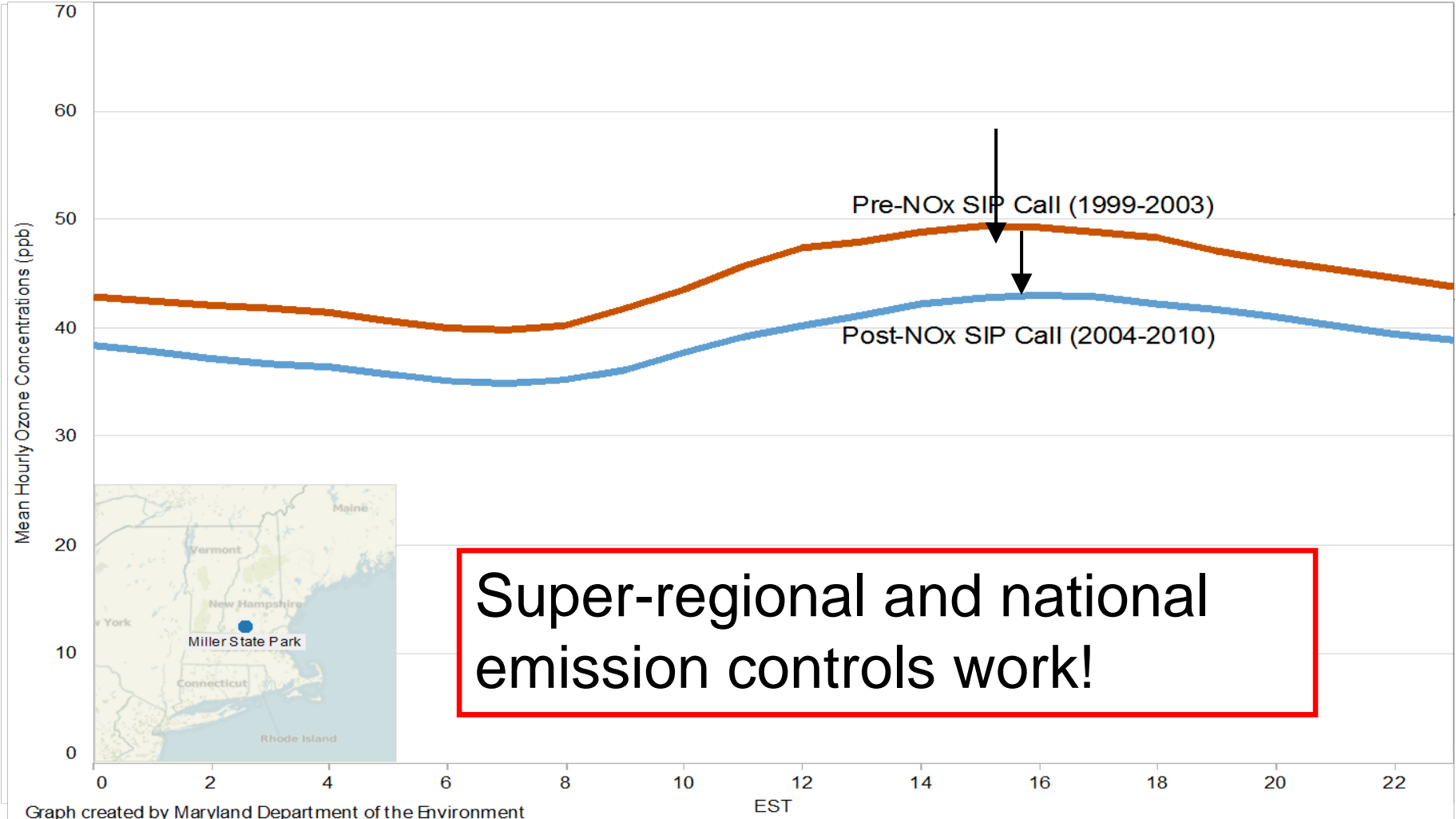
A large reservoir of ozone sits above much of the Northeast on many bad air days waiting to mix down.



Regional and national controls can help with this!

Regional and National Measures Really Reduce Ozone Levels in the Northeast. The Data prove it!

Pre/Post NOx SIP Call Benefits
Miller State Park - 330115001 (2301 Feet above MSL, May-September)



Super-regional and national emission controls work!

Addressing Transport at its Source

- It can lower ozone levels to where incoming concentrations are not already above the standard!
- It works!
- It benefits widespread areas!
- It is cost effective!
- It is fair!